## AMENDMENT

**In the Claims**

Please amend Claims 1-20 as shown below.

1. (original) A method for obtaining a distance to a target by use of a sensing system comprising a signal source, an antenna, and at least a pair of detectors, comprising the steps of:

(a) transmitting a plurality of transmit signals for transmission via the antenna and a plurality of corresponding reference signals for distribution to the at least pair of detectors in response to sweeping in selected frequency increments a frequency band of the signal source;

(b) receiving a plurality of received signals via the antenna, each received signal representing a reflection of one of the transmit signals off of the target;

(c) identifying a rate of change of phase between the reference signals and the received signals as detected by the at least pair of detectors; and

(d) calculating the distance to the target based on the rate of change of phase as a function of frequency between the reference signals and the received signals.

2. (original) The method of Claim 1, wherein the at least pair of detectors are offset in phase.

3. (original) The method of Claim 1, wherein the frequency band comprises the stopband of the antenna and the target comprises the antenna.

4. (original) The method of Claim 1, wherein the frequency band comprises the passband of the antenna, the target comprises an item within the operating environment of the sensing system, and the distance to the target comprises a distance between the item and the signal source.

5. (original) The method of Claim 1, wherein a propagation medium connects the signal source to the antenna, the frequency band comprises the stopband of the antenna, the target comprises the antenna, and the distance to the target comprises the length of the propagation medium.

6. (original) The method of Claim 1, further comprising the step of calibrating the sensing system by:

(i) performing steps (a), (b), (c) and (d) to complete a first calibration measurement, wherein a propagation medium connects the signal source to the antenna, the frequency band comprises the stopband of the antenna, the target comprises the antenna, and the distance to the target comprises the length of the propagation medium;

(ii) performing steps (a), (b), (c) and (d) to complete a second calibration measurement, wherein the frequency band comprises the passband of the antenna, the target comprises an item within the operating environment of the sensing system, and the distance to the target comprises a distance between the item and the signal source, and completing steps; and

(iii) subtracting the first calibration measurement from the second calibration measurement, thereby removing environmental effects associated with the propagation medium from operation of the sensing system.

7. (original) The method of Claim 6, further comprising repeating steps (i), (ii) and (iii) at predetermined times during operation of the sensing system to maintain calibrated operation of the sensing system.

8. (currently amended) A phase-based radar system useful for obtaining a distance to a target comprising:

a signal source operative to generate a plurality of transmit signals and a plurality of corresponding reference signals in response to sweeping in selected frequency increments a frequency band of the signal source;

an antenna, functionally coupled to the signal source, for transmitting the transmit signals and receiving a plurality of received signals, wherein each received signal represents a reflection of one of the transmit signals off of the target;

at least a pair of detectors, functionally coupled to the antenna and to the signal source, for detecting the received signals and the reference signals; and

a processor operative to identify a rate of change of phase between the reference signals and the received signals as detected by the at least pair of detectors,

the processor further operative to calculate the distance to the target based on the rate of change of phase as a function of ~~phase~~ frequency between the reference signals and the received signals.

9. (original) The system of Claim 8, wherein the at least pair of detectors are offset in phase.

10. (original) The system of Claim 8, wherein the frequency band comprises the stopband of the antenna and the target comprises the antenna.

11. (original) The system of Claim 8, wherein the frequency band comprises the passband of the antenna, the target comprises an item within the operating environment of the phase-based radar system, and the distance to the target comprises a distance between the item and the signal source.

12. (original) The system of Claim 8, wherein a propagation medium connects the signal source to the antenna, the frequency band comprises the stopband of the antenna, the target comprises the antenna, and the distance to the target comprises the length of the propagation medium.

13. (currently amended) A computer-implemented method for calibrating a phase-based radar system useful for obtaining a distance to a target, the phase-based radar system comprising a signal source, an antenna and at least a pair of detectors, comprising the steps of:

(a) identifying a length of a propagation medium to the antenna by:

transmitting a plurality of transmit signal to the antenna via the propagation medium and a plurality of corresponding reference signals for detection by the at least pair of detectors in response to sweeping in selected frequency increments the signal source within a stopband of the antenna,

receiving a plurality of received signals from the antenna via the propagation medium, each of the received signals representing a reflection of one of the transmit signals off of the antenna,

determining a rate of change of phase between the reference signals and the received signals as detected by the at least pair of detectors, and

calculating a distance from the signal source to the antenna based on the rate of change of phase as a function of frequency between the reference signals and the received signals;

(b) identifying the distance to the target by:

transmitting a plurality of transmit signals to the antenna via the propagation medium and a plurality of corresponding reference signals for detection by the at least pair of detectors in response to sweeping in selected frequency increments the signal source within a passband of the antenna,

receiving a plurality of received signals from the antenna via the propagation medium, each of the received signals representing a reflection of one of the transmit signals off of the target,

determining a rate of change of phase between the reference signals and the received signals as detected by the at least pair of detectors, and

calculating the distance to the target based on the rate of change of phase as a function of frequency between the reference signals and the received signals; and

(c) completing a calibration of the phase-based radar system by subtracting the length of the propagation medium from the distance to the target to obtain a distance between the antenna and the target.

14. (original) The computer-implemented method of Claim 13 further comprising the step of repeating steps (a), (b) and (c) at predetermined times during operation of the phase-based radar system to maintain calibrated operation of the phase-based radar system.

15. (original) A computer-implemented method for obtaining a distance to a target by use of a phase-based radar system comprising a signal source, at least a pair of detectors offset in phase, and an antenna, comprising the steps of:

(a) transmitting a transmit signal for transmission via the antenna and a corresponding reference signal at a transmit frequency within a predetermined frequency band of the signal source;

(b) receiving a received signal via the antenna, the received signal representing a reflection of the transmit signal from the target;

(c) measuring an amplitude level for the received signal and the reference signal at each of the least pair of detectors, each amplitude level representing a phase difference between the reference signal and the received signal, and storing each amplitude level in a memory storage device to maintain a record of stored amplitude data;

(d) changing the transmit frequency to another transmit frequency within the predetermined frequency band and repeating steps (a), (b) and (c), the other transmit frequency representing an incremental change in the transmit frequency;

(e) repeating step (d) until the predetermined frequency band of the signal source is swept;

(f) calculating a complex Fast Fourier Transform (FFT) for the stored amplitude data; and

(g) calculating the distance to the target by identifying a peak frequency, normalized by the Nyquist rate, for the complex FFT, multiplying the peak frequency by the incremental change in the transmit frequency to derive a target result, and dividing the target result by a constant value.

16. (original) The method of Claim 15, wherein the incremental change in the transmit frequency results in less than pi radians of total phase change between the reference signals and the received signals detected by the at least pair of detectors.

17. (original) The method of Claim 15, wherein the constant value comprises a value of 4pi.

18. (original) A computer-implemented method for obtaining a distance to a target by use of a phase-based radar system comprising a signal source, a pair of detectors offset in phase, and an antenna, comprising the steps of:

(a) transmitting a transmit signal for transmission via the antenna and a corresponding reference signal at a transmit frequency within a predetermined frequency band of the signal source;

(b) receiving a received signal via the antenna, the received signal representing a reflection of the transmit signal from the target;

(c) measuring an amplitude level for the received signal and the reference signal at each of the detectors, each amplitude level representing a phase difference between the reference signal and the received signal, deriving a phase value by calculating the arctangent of a ratio of the amplitude level measured at each of the detectors, and storing the phase value in a memory storage device to maintain a record of stored phase measurements;

(d) changing the transmit frequency to another transmit frequency within the predetermined frequency band and repeating steps (a), (b) and (c), the other transmit frequency representing an incremental change in the transmit frequency;

(e) repeating step (d) until the predetermined frequency band of the signal source is swept;

(f) determining unwrapped phase values by completing phase unwrapping of the stored phase measurements;

(g) calculating a slope of a line derived from a comparison of the unwrapped phase values to the wavelength for each transmit frequency in step (d); and

(h) calculating the distance to the target by multiplying the slope by a ratio of the longest wavelength in step (g) to the shortest wavelength in step (g) to derive a target result and dividing the target result by a constant value.

19. (original) The method of Claim 18, wherein the incremental change in the transmit frequency results in less than pi radians of total phase change between the reference signals and the received signals detected at the at least pair of detectors.

20. (original) The method of Claim 18, wherein the constant value comprises a value of 4pi.